

IOWA HIGHWAY RESEARCH BOARD (IHRB)

Minutes of April 30, 2010

Regular Board Members Present

A. Abu-Hawash
J. Berger
V. Dumdei
J. Joiner

R. Knoche
J. Moellering
B. Moore
M. Nahra

C. Schloz
J. Waddingham
W. Weiss

Alternate Board Members Present

K. Mayberry for D. Ahart
S. Nambisan for J. Alleman
D. Schnoebelen for K. Hornbuckle
W. Zitterich for J. Adam

Members With No Representation

None

Alternates Present as Guests

M. Kerper
R. Younie

Secretary - M. Dunn

Visitors

Brian Keierleber

Buchanan County

Max Grogg

Federal Highway Administration

Chris Brakke
Ken Dunker
Edward Engle
Sandra Larson
Ping Lu
Scott Schram
Mary Starr

Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation
Iowa Department of Transportation

Brian Gelder
Kasthurirangan Gopalakrishnan
Brent Phares

Iowa State University
Iowa State University
Iowa State University

Robert Schletzbaum

Marion County

Bart Berquist

University of Northern Iowa

The meeting was held at the Iowa Department of Transportation Ames Complex, Materials East/West Conference Room, on Friday, April 30, 2010. The meeting was called to order at 9 a.m. by Chairperson Jay Waddingham with an initial number of 14 voting members/alternates at the table.

Agenda

No changes were made to the Agenda.

Approval of the Minutes

Motion to approve minutes from the February 26, 2010, meeting by J. Berger. 2nd by V. Dumdei.
Motion carried with 14 aye, 0 nay, 0 abstaining.

*** One Member Joined the Table***

FINAL REPORT TR-450, "Identification of Laboratory Techniques to Optimize Superpave HMA Surface Friction Characteristics," Becky McDaniel, Purdue University/North Central Superpave Center (\$80,000)

BACKGROUND

The scope of this study included the investigation of the relationship between mixture composition and the following pavement characteristics: surface texture, friction and polishing resistance. Based on the relationship between texture and friction, an International Friction Index (IFI)-based flag friction value was developed to serve as a reference point for laboratory type testing.

OBJECTIVES

Laboratory testing on various aggregate gradations (fine, S-shaped and coarse) and aggregate sizes of Superpave mixtures. Aggregates commonly used in HMA in the north central region of the USA were combined with different percentages (from 0-70%) of two high friction aggregates to produce mixes used in the study. In addition, one stone matrix asphalt (SMA) and one porous friction course (PFC) mix were also tested.

BENEFITS

A new laboratory testing methodology was developed and refined during this study to allow for determination of two crucial properties for characterizing and predicting pavement friction: polishing rate and terminal friction value. The research proved it is possible to modify frictional properties of pavement by changing the aggregate type and HMA composition.

Q: Were the terminal frictions for the High Friction Aggregates (HFA) and the limestone similar, or was there a high number for the special mixes?

A: The HFA in Matrix 2, for example, had zero friction aggregate content - the terminal friction value on that was definitely lower. The polishing rate and slope of the curve was higher, which produced drastic changes. However, when using a blend with a little bit of friction aggregate (20% or more) with the limestone, a lower terminal friction was achieved that matched the baseline.

Motion to Approve by J. Berger. 2nd by B. Moore.

Motion carried with 15 aye, 0 nay, 0 abstaining.

FINAL REPORT TR-593 "Iowa's Renewable Energy and Infrastructure Impacts," Nadia Gkritza and Inya Nlenanya, Iowa State University (\$120,000)

BACKGROUND

A total of 96 of Iowa's 99 counties responded to a survey regarding types of biofuels production plants or wind energy farms in place, under construction, or in the planning stage. County engineers from several southeastern Iowa counties were selected for in-depth interviews and historical maintenance cost data collection from the Iowa County Engineer's Service Bureau to determine cost trends before and after biofuels plants and wind farms were constructed those counties. Researchers also designed an impact calculator to determine the incremental cost of new traffic generated as a result of a biofuels plant based on plant capacity, quantity of raw material, and pavement thickness data. Impacts were visualized using geographic information system (GIS).

OBJECTIVES

Objectives were to: Estimate traffic growth and pavement deterioration due to Iowa's growing renewable energy industries in a multi-county area; Develop a traffic and fiscal impact model to help assess the impact of

additional biofuels plants on Iowa's transportation system; Suggest public policy changes to local governments in order to provide adequate infrastructure for the renewable energy industries.

BENEFITS

Examining the renewable energy industry and its impact on Iowa's transportation system can help counties predict how their infrastructure needs and expenditures will change when a biofuels plant or wind farm is constructed in their jurisdiction.

Q: Was there any indication that the damage to gravel roads was actually more than that for the pavement?

A: It was more significant, however, additional research is needed because there was no way to quantify results.

C: The challenging thing is that the amount of money that we spend isn't necessarily the amount of money that we need to spend, and that was a comment from all of the counties contacted.

Motion to Approve by M. Nahra. 2nd by R. Knoche.

Motion carried with 14 aye, 0 nay, 1 abstaining.

FINAL REPORT TR-582, "Biofuel Co-Product Uses for Pavement Geo-Materials Stabilization," Halil Ceylan, Iowa State University (\$50,000)

BACKGROUND

Biofuel production from plant biomass produces biofuel or ethanol but also co-products containing lignin, modified lignin, and lignin derivatives. This research investigated the utilization of lignin-containing biofuel co-products (BCPs) in pavement soil stabilization as a new application area. Laboratory tests were conducted to evaluate the performance and the moisture susceptibility of two types of BCP-treated soil samples compared to the performance of untreated and traditional stabilizer-treated (fly ash) soil samples.

OBJECTIVES

To investigate the utilization of BCPs containing lignin in pavement geomaterials stabilization

BENEFITS

Utilizing BCPs as a soil stabilizer is one of many viable answers to the profitability of the bio-based products and the bioenergy industry. Innovative uses of BCP in pavement-related applications could provide additional revenue streams to improve the economics of biorefineries, and serve to establish green road infrastructure.

Q: Is the material in a stable state or will it degrade over a period of one to five years? If you don't know the answer to that, is there an accelerated test to determine that?

A: We use pyrolytic lignin, which is water insoluble and durable, so it should not degrade over a short period of time. There are very promising results from samples not included in this study.

Q: Is there an accelerated test to determine saturation?

A: The freeze-thaw test provides good results and was discussed at TRB.

Motion to Approve by W. Zitterich. 2nd by V. Dumdei.

Motion carried with 14 aye, 0 nay, 1 abstaining.

FINAL REPORT TR-592, "Bridge Rail and Approach Railing for Low-Volume Roads In Iowa," Zach Hans, Iowa State University/InTrans (\$50,000)

BACKGROUND

Bridge rail and approach guardrails provide safety by shielding more hazardous objects and redirecting vehicles to the roadway. However, guardrail can increase both the initial and maintenance costs of a bridge, while adding another object that may be struck by vehicles. Most existing low volume road (LVR) bridges in the state of Iowa are currently indicated to not possess bridge rail meeting "current acceptable standards."

OBJECTIVES

The primary objective was to provide the nation's bridge and approach rail state of practice and perform a statewide crash analysis on bridge rails and approach guardrails on LVR bridges in Iowa. In support of this objective, the criteria and guidelines used by other bridge owners were investigated, non-standard and innovative bridge and approach guardrails for LVR's were investigated, and descriptive, statistical and economical analyses were performed on a state wide crash analysis.

BENEFITS

These findings potentially highlight the importance of appropriate delineation and signing. System-wide, benefit-cost (B/C) analyses yielded very low B/C ratios for statewide bridge rail improvements. This finding is consistent with the recommendation to address specific sites where safety concerns exist.

Q: Did you have any data to consider with regard to bridges that were on curves?

A: There was curvature information available, however, we weren't able to work with that very much. There has been some research that suggests curvature plays a role but I do not have that information.

Q: Bridges at night that have lighting as opposed to similar bridges that do not – was that examined?

A: It was important to quantify that. We examined an inventory of 17,000 bridges less than 20 feet long over an eight year period using a very low number of crashes (less than 350).

C: I was on the TAC, and the work they did on accident records was exhaustive; I've never seen those gone into in such detail. The work is to be commended.

Motion to Approve by M. Nahra. 2nd by J. Moellering.

Motion carried with 14 aye, 0 nay, 1 abstaining.

FINAL REPORT TR-555, "Evaluation of Hot Mix Asphalt Moisture Sensitivity Using the Nottingham Test Equipment," Chris Williams, Iowa State University (\$75,000)

BACKGROUND

AASHTO T 283 is the standard test used in moisture susceptibility evaluation of asphalt mixtures, but results of the test are not representative of the expected behavior of asphalt mixtures. The results of the dynamic modulus test can be used directly in the *Mechanistic-Empirical Pavement Design Guide* (MEPDG) and are considered a very good representation of the expected field performance of the mixture. Further research is needed to study how moisture results affect the dynamic modulus. The flow number test was studied in previous research as a candidate test for moisture-susceptibility evaluation, but the results of that research were not favorable.

OBJECTIVES

To evaluate the usefulness of the dynamic modulus and flow number tests in moisture-susceptibility evaluation; To compare the results to those achieved using the AASHTO T 283 test; and to study the effect of different methods of sample conditioning and testing conditions; and study the variability in the test results.

BENEFITS

By comparing asphalt mixture test results using samples having undergone dynamic modulus testing with and without freeze/thaw cycling, moisture-susceptible mixtures can be more accurately identified than with other tests.

Motion to Approve by J. Berger. 2nd by W. Weiss.

Motion carried with 14 aye, 0 nay, 1 abstaining.

RFP FINILIZATION FROM FY09-10

Both of these are HMA-related projects from last year's funding. Both are expected to be complete in 24 months with a budget of \$150,000 each. Scott Schram, Iowa DOT bituminous materials engineer is the technical contact for these projects. Resulting proposals will be discussed at the May/June meeting.

IHRB-09-06 Quality Control/Quality Assurance Testing for Joint Density and Segregation of Asphalt Mixtures

This project will consist of field testing of pavement density during construction and existing pavement sections exhibiting longitudinal open joints and compare and evaluate destructive and non-destructive testing for identifying segregation and QC/QA of centerline joints.

IHRB-09-07 Development of Quality Standards for Inclusion of High Recycled Asphalt Pavement Content in Asphalt Mixtures

This project will utilize performance testing and asphalt binder testing at all temperature regimes to characterize the binder contained in RAP and determine whether or not results are source dependent.

IHRB comment: RFPs will be dispersed as written.

DISCUSSION IHRB TRAVEL MEETING

IHRB member Doug Schnoebelen, The University of Iowa, extended an invitation to the Board to visit the Lucille A. Carver Mississippi Riverside Environmental Research Station (LACMRERS), located on the Mississippi River near Muscatine, Iowa, during its upcoming Travel Meeting scheduled for July 30, 2010. The University will host the visit and provide the Board a unique look at hydraulic sedimentation and hydroacoustic research underway at the University. A boat tour is planned and lunch provided.

C: I'd like to see the facility. I think it's a great location.

C: That is one area of the state we haven't visited in quite some time. I think it would be beneficial to visit the site.

No further discussion.

The Travel Meeting being held in July, we'll finalize arrangements with Doug and the University during the next several weeks. Hotel information will be emailed.

FY2010-2011 PROJECT TOPIC PRIORITAZATION

Voting Process

Prior to voting at April's meeting, there was an opportunity for individuals to show support and explain the need or significance of a particular project. Each regular Board member or their Alternate, received 20 votes to be placed on various topics of interest. A maximum of 4 votes were placed on any one topic by a voter to weigh importance. After each voter placed all 20 of their votes, totals were tallied and projects ranked. Individual members (and/or their Alternates) not present submitted their votes prior to the meeting for ranking.

A guest and several Board Members spoke in support of the following Topics:

Brian Gelder, Iowa State University

Topic 4.10, Update of Drainage of Iowa Streams (the Red Book) Using LiDAR Data and GIS

Robert Younie, IHRB Member, Iowa DOT representative

Topic 8.05 Risk Mitigation Strategies for Operations and Maintenance Activities

Topic 9.02, Evaluating Vibration Impacts on Drivers and Operators of Road Construction and Maintenance Equipment.

William Zitterich, IHRB Alternate Member for John Adam, Iowa DOT representative

Because of similarities, the following two Topics were combined:

Topic 3.02, Optimization of Snowfence Design for Iowa Conditions and

Topic 6.03, Combination Snowfence/Right of Way Fence

James Berger, IHRB Member, Iowa DOT

Topic 5.11, Alkali Content of Fly Ash: Measuring and Testing Strategies for Evaluating Compliance

Ahmad Abu-Hawash, IHRB Member, Iowa DOT

Topic 10.02, Evaluate the Need for Washing of Weathering Steel

Topic 10.05, Improving Accuracy of the Deflection and Camber Predictions for Prestressed Concrete Bridge Girders

NOTE: Sandra Larson, director, Iowa DOT Research and Technology Bureau, announced an upcoming Research Seminar related to Topic 4.10, Update of Drainage of Iowa Streams (the Red Book) Using LiDAR Data and GIS, to be held Wednesday, May 5th beginning at 10:15 a.m.

The presentation will be placed online for those unable to attend.

IHRB VOTING

	30-Apr-10	Meeting Votes
10.05	Improving Accuracy of the Deflection and Camber Predictions for Prestressed Concrete Bridge Girders	22
6.03	Combination Snowfence/Right of Way Fence	19
8.05	Risk Mitigation Strategies for Operations and Maintenance Activities	18
5.11	Alkali Content of Fly Ash: Measuring and Testing Strategies for Evaluating Compliance	18
1.01	Low Cost Rural Road Surface Alternatives	16
10.01	Detection of Voids Below Approach Pavement	14
4.02	Evaluating Roadway Subsurface Drainage Practices	14
10.02	Evaluate the Need for Washing of Weathering Steel	14
5.03	Investigation into Shrinkage of High Performance Concrete Used for Iowa Bridge Decks and Overlays	14
11.01	Temporary Traffic Control Plans for Local Agency Improvements	13
5.09	Evaluate the Effect of Sample Curing on Quality Assurance Testing of WMA Mixtures	13
4.10	Update of Drainage Areas of Iowa Streams (the Red Book) using LIDAR data and GIS	12
1.02	Optimizing Pavement Base, Subbase, and Subgrade Layers for Cost and Performance on Local Roads	12
5.06	Evaluation of Epoxy Patching Materials for Concrete Pavement	11
7.04	Impact Of Curling and Warping on Concrete Pavement	11
10.04	Adapting Accelerated Bridge Construction (ABC) Best Practices for Small Scale Projects with Local Jurisdictions	10
8.02	Investigating the Impact of Tax Increment Financing on Iowa's Secondary Road System	10
8.07	Update the guidance information available for New County Engineers	9
6.01	Pavement Surface Rehabilitation Techniques for Poor Subgrade Conditions in Iowa	6
4.03	Riverbed Scour & Deposition Monitoring Plan for Floods Using a Multibeam Hydrographic Survey System	6
8.04	Route-Specific Traffic and Fiscal Impact Calculator for Iowa's Renewable Energy	6
5.08	Increasing the Stability of Unbound Shoulder Materials	5
11.02	Perform an In-depth Study of Low Volume Rural Road Crashes	4
5.07	Use of Recycled Concrete Aggregates in New Pavements	3
9.01	Linking Highway Improvements to Changes in Land Use	3
9.02	Evaluating Vibration Impacts on Drivers and Operators of Road Construction and Maintenance Equipment	3
4.06	Hydro-Enforcement of LiDAR-Derived Stream Centerlines Using County Bridge and Culvert Databases	2
5.02	Preventing Random Cracking Through Proper Design and Concrete Mixes	2
6.02	Investigation and Evaluation of Iowa Department of Transportation Bridge Deck Epoxy Injection Process	2
7.03	Concrete Overlay: Surface Milling of Asphalt Pavements	2
11.03	The Effect of Roadside Vegetation on Frequency of Deer Collisions	2
4.04	Hydraulics Evaluation of Various Methods for Deflecting Debris From Bridge Piers	1
4.01	Low Impact Design Practices BMPs Pollutant Reduction	1
3.01	Evaluation and Rating of the Effectiveness of Temporary Erosion and Sediment-Control Measures in Iowa Conditions	1
1.03	LRFD Design of Drilled Shafts	1
4.09	Pilot Project for a Hybrid Road-Flooding Forecasting System on Squaw Creek	1

NEW BUSINESS

None

ADJOURN

Motion to Adjourn by S. Nambisan. 2nd by B. Moore.

Motion carried with 15 aye, 0 nay, 0 abstaining.

The next meeting of the Iowa Highway Research Board will be held on Friday, May 21, 2010, in the East/West Materials Conference Room at the Iowa DOT.

Mark J. Dunn, IHRB Secretary